Exhibit 2
Response to comments on Draft Director's Rule 29-2017

The proposed Director's Rule clarifies how much graywater holding tank capacity must be installed in a floating on-water residence or house barge if the residence expands by more than 120 square feet. Nine people submitted written comments to the Seattle Department of Construction and Inspections regarding Draft Director's Rule 29-2017. A summary of comments is included as Exhibit 1. This document, Exhibit 2, responds to the specific issues and general themes raised in the comments. The comments are reproduced in full in Exhibit 3.

Theme 1: ***The proposed rule is too harsh, unnecessary, and inequitable***

Commenters objected to the proposed rule suggesting the City lacked understanding and expertise. Other comments suggest the rule is designed to make it difficult to expand beyond 120 square feet and that the rule is unreasonable to the point of being prohibited by state law. Some commenters questioned why only FOWRs and House Barges were being subjected to the proposed rule and suggested that if on-water residences had to contain graywater then the same rules should apply to all liveaboards, and also to boatyards and marinas in general.

Response: The requirement to contain graywater if a floating residence expands by more than 120 square feet was adopted in the 2015 update to the City's Shoreline Master Program. See sections 23.60A.203.C.1.e.5 and 23.60A.204.C.1.e.5. State law does not speak to or even specifically allow expansions of floating residences. The requirement in state law reads as follows: RCW 90.58.270(6)(a) "A floating on-water residence legally established prior to July 1, 2014, must be considered a conforming use and accommodated through reasonable shoreline master program regulations, permit conditions, or mitigation that will not effectively preclude *maintenance, repair, replacement, and remodeling of existing floating on-water residences* and their moorages by rendering these actions impracticable." (emphasis added). Expansion goes beyond what is considered a remodel. Thus, allowing any expansion is a significant benefit to floating residence owners. In order to balance City policy objectives for clean water and protection of shoreline views with homeowner interests for more expansive on-water living quarters, the City agreed that some expansion could occur (120 sf) without addressing graywater. Larger expansions require a hook up to sewer or containment and pump-out of graywater. This is a code requirement specific to floating on-water residences and house barges. To impose graywater containment as a requirement for all marinas, boatyards, or for liveaboards on conventional recreational vessels or vessels with dwelling units would require a code change.

Theme 2: ***FOWR graywater is not the problem, or is not a problem at all***

Commenters asserted that stormwater is a greater source of pollution in Lake Union is graywater. They also wrote that on-water residents use Best Management Practices to minimize the impacts of graywater. Some noted that conventional vessels have the ability and do sometimes discharge black water from their toilets into the lake.

Response:

Graywater containment is a code requirement and the rule provides methods to meet that requirement. The code does not address stormwater or other pollution sources, and it requires residents to follow best practices regardless of containment or hook-up. Although stormwater is a major pollutant for

inland lakes and Puget Sound, graywater is also a pollutant. Several jurisdictions have done studies that show graywater contains e coli and fecal coliform bacteria in addition to chemicals from hygiene and personal care products, laundry and dishwasher soaps and rinses, cleaning products, and other household products. The California Water Board in Region 5 has concluded that : "Houseboat graywater is a high strength high pathogen waste, and allowing such discharges to continue is not consistent with the Regional Board's mandate to protect beneficial uses of surface waters."[1]

In California, the Regional Water Board prohibited graywater discharges in Shasta Lake via a Memorandum of Understanding[2] with the US Forest Service, the federal agency that permits the various marinas and houseboat rental services on Shasta Lake. Another example is in British Columbia where the Final Report on the Review of Greywater Management Strategies to Improve Public Health and Water Quality in Shuswap Lake states: "The contaminants in greywater are numerous, ranging from bacteria and viruses to limiting nutrients to endocrine disruptors, pharmaceutical and personal care products and possible carcinogens."[3] British Columbia prohibits graywater discharges in their inland lakes.

In Australia, the South Australia Environment Protection Authority prohibited graywater discharge from all vessels, including houseboats, and was requiring retrofits and the installation of graywater treatment systems. The treatment systems were not as effective as needed, and the general requirement is now to separate galley water and contain it the same as for blackwater. They continue to review other options for containment or treatment that would apply to their entire houseboat fleet.

A key point to note is that the regulations in California at Shasta Lake, in British Columbia at Shuswap Lake and in Australia at Lake Eildon apply to vessels that travel. These three lakes are also much larger in size than Lake Union.

In Australia, permanently occupied or moored "vessels" must comply with stricter graywater regulations than vessels that regularly navigate. The Australia Code of Practice for Vessel and Facility Management includes the following Key Note: "The greatest risk to human health from the discharge of grey water comes when vessels are moored alongside one another, especially within enclosed marina basins where water exchange is significantly reduced."[4] The Australian code requires that permanently moored vessels not discharge any graywater, whether treated or not, to waters.[5]

The point of this response is to clearly show that several other major government bodies around the world view graywater discharges into lakes and marine water bodies as a problem. And to reference valid scientific information supporting the regulation of graywater discharges. See the Review of Greywater Management Strategies to Improve Public Health and Water Quality in Shuswap Lake, Final

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[1] Staff Report to California Water Board, Central Valley Region, in support of MOU with US Forest Service requiring Graywater Containment for Shasta Lake Houseboats. See Exhibit 4.

[2] Memorandum of Understanding between USDA, Forest Service and California Regional Water Quality Control Board, Central Valley Region, January 2004. See Exhibit ___.

[3] Review of Greywater Management Strategies to Improve Public Health and Water Quality in Shuswap Lake. Final Report July 28, 2010, prepared by Northwest Hydraulic Consultants. See Exhibit ___.

[4] http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwijrOea5tjZAhWqv1QKHWN8BxUQFggpMAA&url=http%3A%2F%2Fwww.epa.sa.gov.au%2Ffiles%2F47792_vessels.pdf&usg=AOvVaw0njH_DYcyqQnkE1XYLJ2z9 see page 62

[5] Id., see page 63

Report, July 28, 2010[6] for detailed study information and literature review of the contaminants found in houseboat graywater. See Lake Eildon Houseboat Greywater Review Final Report March 29, 2017[7] which acknowledged that for houseboats navigating Lake Eildon, a lake of 53 square miles, "[t]he impacts of greywater discharge are expected to be minimal in the whole-of-lake context, but add to the health and environmental risks in specific locations and conditions"[8] and that "[d]ischarge of pathogens (e.g. bacteria, viruses) associated with greywater represents a small but plausible health risk to recreational users (including houseboat operators) in harbour and marina areas."[9]

Theme 3: ***Cost is too high***

Commenters objected to the proposed rule noting that the cost of pumping out large graywater tanks would be very expensive. Also, the cost to install land based graywater treatment or sewer systems for marinas would be very high. Some suggested the City should take on some or all of the cost and help with installation of sewer systems, referencing what had been done when floating homes were hooked up to City sewer services.

Response: The trigger for graywater containment is expansion beyond 120 square feet. Owners who do not expand beyond that limit may continue expelling all their graywater into the lake, bay, canal or other body of water. Cost for voluntary expansions is not recognized in the code requirement as a reason to avoid graywater containment. In fact, the code provides no exemptions for graywater containment if an expansion exceeds 120 square feet.

Regarding City support for sewer hookups: In the 1960's and into the 1970's, regulations for floating home sewer hookups were developed and implemented. Although most of the cost was borne by the floating home owners and moorage owners, there was City support for extending sewer lines through City rights-of way when they were absent. The costs of side sewer lines on non-City property and the plumbing connections along the piers were borne by the property owners. Today, sewer lines exist and connections via side sewer are possible. Plumbing costs along the piers would be borne by the property owners. SDCI would be happy to help facilitate information gathering at the King County Department of Public Health (plumbing permits), Seattle Public Utilities Department (wastewater group), King County Metro, and/or state and federal agencies to help floating on-water residence and house barge owners who wish to explore options for designing or funding sewer or graywater solutions for the community. Unfortunately, there is not a City funding source to support those hookups.

Theme 4: ***Capacity/feasibility of pumping out***

A common theme was that the mobile pumpout boats are too small and do not have tanks of sufficient capacity to pump out 840 gallons of graywater; that the mobile services would have to make many trips to empty a large graywater tank. In addition, commenters claimed that land-based septic pumpout trucks were either prohibited from pumping floating residences or that they would not or could not pump them.

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[6] https://www.fraserbasin.bc.ca/_...SLIPP/SLIPP_NHC_Greywater_Report_July2010.pdf
[7] https://www.g-mwater.com.au/downloads/gmw/Houseboats/20170512_Jacobs_Final_Report_on_Eildon_Houseboats_Greywater_Review_-_29_March_20.pdf
[8] id., page 1.
[9] ibid.

Response: SDCI spoke with three mobile pumpout services that operate on Lake Union. Sanitug, has a capacity of just over 300 gallons. It would take three trips for Sanitug to pump out an 840 gallon tank. SS Head can carry about 500 gallons and Pump-me-out can take at least 350 gallons per trip. SDCI also reviewed documentation from the State Department of Ecology which provided detailed information about other water-based mobile pumpout companies. With increased market demand for more capacity in the pumpout boats, SDCI would expect the pumpout companies to respond.

Regarding land-based pumpout trucks: The following website shows the Certified Liquid Waste Pumper-Hauler list for King County: https://www.kingcounty.gov/depts/health/environmental-health/piping/onsite-sewage-systems/professionals/~/media/depts/health/environmental-health/documents/oss/list-of-certified-liquid-waste-pumper-hauler.ashx . Six businesses are licensed in King county to pump vessel holding tanks. SDCI called three of the six. Two pumpers said they preferred not to pump vessels or houseboats even though they were licensed to do so. One of the two had recent experience pumping a larger luxury yacht. This pumper suggested that with an onboard pump, a floating residence owner might pump their own graywater to a mobile tank on their dock, to a larger tank on land, or when available, into a marina pumpout station. The third pumper said his business would be willing to take a floating residence client. Without knowing more he could not give an estimate of cost but suggested his services would be competitive with water-based mobile pumpers.

These conversations with the land-based pumpout companies showed that the options for pumping out to a truck would be limited, but they do exist. The pumpers confirmed that their services can be expensive, but a larger holding tank that needed less frequent pumpouts could lower costs.

Theme 5: ***Stability and tank size***

Several commenters suggested that installing a tank of the proposed size would create a stability problem on board a floating residence or that the additional weight (approx. 7000 lbs. plus the weight of the tanks) will sink a residence or that it was just impossible because a tank of that size would not fit. One commenter wrote that the tanks could be designed to be low in profile and placed in several locations so that they would increase stability.

Response: The containment requirement only applies when an expansion of more than 120 sf is proposed. In those cases, the expansion could include modifications to the structure, including the hull or floats, to accommodate graywater containment. Two expansion projects and one barge rebuild project have been approved by SDCI with graywater containment tanks. The two expansion projects showed a 300-gallon tank located on the main floor of each residence. These two projects expanded by 342 and 650 square feet, respectively. The plans for the rebuilt barge showed a decrease in size of approximately 100 square feet and also described a blackwater tank and a voluntary graywater tank, each of 750 cubic feet. Translated to gallons, each tank on the barge would hold over 5600 gallons. Graywater containment on the rebuilt barge was voluntary because the final living area shrank instead of being expanded.

Because the code requirement for graywater is tied to an optional action, SDCI expects that if an owner of a floating residence plans to expand beyond 120 sf, they will evaluate the best options for graywater containment and design the required tanks into their plans.

Theme 6: ***What facts support this rule?***

Commenters suggested the rule was not based on facts or sought additional information about how the

estimates for graywater production were developed. Several comments challenged the graywater production estimates by noting that many on-water residents use best management practices to minimize water use. Commenters also questioned why the rule was needed, which may have been a question about whether any studies demonstrate that graywater is an environmental issue.

Response: As noted throughout, graywater containment was adopted as a requirement into the Shoreline Code in 2015 and this rule will help SDCI enforce the requirement for graywater containment. It will also provide clear direction to floating residence owners who seek to expand their homes. See theme 2 for information about the harmful effects of graywater, particularly in marinas and smaller bodies of water.

Regarding production of graywater: the draft rule used an estimate of 30 gallons of graywater production per person per day. SDCI reviewed the Seattle Public Utilities estimate for residential water use of 47 gallons per day for indoor use and subtracted 24%, which is the SPU estimate for toilet water. This number, 35.72 gallons per person per day, was lowered to reflect the estimates that were referenced in Coast Guard materials for a variety of ships including cruise ships and fishing vessels. These materials showed graywater production of 113.6[10] liters per person per day or 30 gallons.

In response to the comments received SDCI reviewed additional information from the US EPA on vessel graywater generation, and from British Columbia, Australia and California, where studies have been done specifically on houseboat graywater.

The US EPA study looked at graywater discharges from vessels[11] and reported graywater generation rates in response to an EPA cruise ship survey in 2004. The rates ranged from 36 to 119 gallons/day/person, with an average of 67 gallons/day/person for large cruise ships.

The EPA study also pointed to a report from the Baltic Marine Environment Protection Commission, which found that cruise ship graywater generation is approximately 120 liters per person/day (32 gallons/day/person), and an Ocean Conservancy estimate of cruise ship grey water generation ranging from 114 to 322 liters per day (30 to 85 gallons/day/person).

One perhaps more comparable source about graywater production is found in the Lake Eildon (Australia) Houseboat Graywater Review, Final Report 29 March 2017.[12] It referenced, at page 71, graywater production at 130 Liters (34 gals) per person per day and also referenced graywater production of 120 liters (32 gals) per person per day, citing to Lloyd's Register Rule and Regulations for the Classification of Ships. The British Columbia study[13] cites to graywater production of 150 liters (40 gals) per person per day (page 49) but notes that minimizing water use could reduce graywater production to about 100 liters (26 gals) per person per day. (page 64). This study even speculated that production as low as 60 liters (16 gals) per person per day was possible. (page 64).

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[10] This reference was in materials found in the original staff file. A current reference to the data was not found online, so SDCI reviewed additional data from the US EPA, and studies from Australia, and British Columbia.

[11] https://www3.epa.gov/npdes/pubs/vgp_graywater.pdf see page 6.

[12] https://www.g-mwater.com.au/downloads/gmw/Houseboats/20170512_Jacobs_Final_Report_on_Eildon_Houseboats_Greywater_Review_-_29_March_20.pdf

[13] See Shuswap Lake study refernced previously in footnote 3

In response to these additional studies, SDCI has concluded a lower graywater production figure should be used as the starting place for deciding the containment requirement.

Theme 7: ***Support***
Two commenters wrote in support of the rule, noting that it seemed reasonable and that people who are lucky enough to live on Lake Union should be responsible stewards.

Response: Comments acknowledged.

Theme 8: ***Alternatives***
Four alternatives or additional recommendations were submitted: (1) Have a sliding scale for graywater containment based on the size of the residence; (2) Require verification of pump-outs with receipts submitted annually to SDCI; (3) Allow graywater treatment as an alternative to containment and pump outs; (4) Assume weekly pump-outs, not every two weeks.

(1) <u>Sliding scale based on size.</u>

Response: SDCI found that graywater production is tied to the number of persons using water, not the square footage of the living area. The initial approach was to look at additional bedrooms as an indicator of the number of residents rather than using a simpler square footage trigger. Both approaches have good and bad points. Square footage is easy to measure but might penalize a lone resident who seeks an expansive living space or miss the mark for multi-resident households that live in very close quarters. Bedrooms might give a good indication of the number of persons regularly using the residence, but the number of people using one bedroom might shift and bedrooms are relatively easy to conceal on plans by calling them dens or simply constructing the enclosure after plans are finaled.

SDCI reviewed nine sets of plans to see what sizes of floating residences were being remodeled or expanded. We found that six of the nine expanded by less than 120 sf. We also reviewed the sizes of floating residences that were expanded by more than 120 sf. There appears to be no defining factor or uniformity in the expansion proposals and there is no uniformity in the current group of verified floating on-water residences and house barges.

Unless the expanded size is quite small, therefore, SDCI will assume a two person household on all floating residences that expand. Only if the finished size is less than 320 square feet, will the graywater calculation be based on only one resident. If the expanded residence has more than 1280 sf of living area after the expansion, then graywater capacity to accommodate a third resident will be required.

(2) <u>Verification of pumpouts</u>.

Response: One commenter suggested that SDCI require verification of pumpouts annually and that this be managed by having owners submit receipts from their pumpout services. SDCI has approved two expansions with required graywater containment so far. Reporting on pumpouts was not required for either one, but could have been. The Director's Rule will require quarterly verification, which might be done via pumpout receipts, to show that graywater from expanded floating residences is not being discharged to the water.

(3) Graywater treatment.

Response: Based on the studies in British Columbia, Australia and at Shasta Lake, the treatment systems currently available are not a workable long-term solution. In addition, Seattle's Shoreline Code would have to be changed to allow graywater treatment rather than containment or discharge to a sewer system.

(4) Weekly pumpout option.

Response: One commenter suggested that the size of the tanks be based on weekly pumpouts instead of every two weeks. This is a workable idea and will be reflected in the minimum tank size requirements.

_____ END _____